2000

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Repository Citation

Noger, Martin C., "Generalized Geologic Bedrock Conditions as Related to Solid-Waste Landfills in Kentucky" (2000). *Kentucky Geological Survey Map and Chart*. 21.
https://uknowledge.uky.edu/kgs_mc/21

KENTUCKY GEOLOGICAL SURVEY
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MAP AND CHART SERIES 21
Series XII, 2000
https://doi.org/10.13023/kgs.mc21.12

GENERALIZED GEOLOGIC BEDROCK CONDITIONS AS RELATED TO SOLID-WASTE LANDFILLS IN KENTUCKY

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Unit 1: Limestone

⬜ Areas of limestone generally present severe limitations for use as landfills. These rocks are generally very hard, requiring blasting or heavy equipment for excavation, and the depth of soil coverage is highly variable. In addition, limestones are soluble in water, and sinkholes and solution cavities are common in areas of gently sloping topography underlain by these rocks. Ground water flowing through fractures and solution openings is easily contaminated by leachate from landfills, and this ground water eventually emerges as springs or discharges into lakes or rivers. In some areas of Kentucky underlain by limestones, soils more than 30 feet thick have been reported. Depending on the type of soil, thickness, topographic position, and drainage conditions, some limestone areas could provide adequate geologic conditions for landfill use.

Unit 2: Sandstone

🟩 Areas of sandstone present severe limitations for use as landfills. These rocks are generally very hard, requiring blasting or heavy equipment for excavation. Sandstones tend to form thin soils and steep slopes. Ground water flowing through openings between sand grains and along fractures (widely spaced cracks) could be easily contaminated by leachate from landfills. West of Kentucky Lake, the deposits include unconsolidated and commonly porous sands.

Unit 3: Unconsolidated Deposits

🟨 Areas of unconsolidated deposits present severe limitations for use as landfills. These deposits consist of non-cemented clay, sand, and gravel and are found primarily in stream valleys. West of Lake Cumberland, these deposits occur both in stream valleys and upland areas. They are easily eroded during rainstorms. West of Lake Barkley, these deposits include loess (a fine-grained material deposited by wind) that possibly could be used as cover material for landfills.

Unit 4: Fractured Shales

🟫 Areas of fractured shale present moderate limitations for use as landfills. Fresh exposures of fractured shale are hard and require heavy machinery for excavation. These shales contain joints that transport water into the ground, which could possibly lead to contamination by leachate.

Unit 5: Clay Shales

🟦 Areas of clay shale are only slightly limited for use as landfills. These shales are easily excavated and restrict ground-water movement. The high clay content can produce land slippage and workability problems.

Unit 6: Interbedded Shales and Limestones

🟪 Areas where bedrock is composed of 80 percent or more shale and 20 percent or less limestone are slightly limited for use as landfills. Limestone layers are usually 2 inches or less thick. These rocks are easily excavated and generally restrict ground-water movement. Oversteepened banks and artificial cuts are subject to slippage.

Unit 7: Interbedded Clay Shales and Sandstones

🟥 This unit consists of a series of interbedded clay shales and sandstones. Areas underlain by 30 feet or more of clay shale present slight limitations, and areas underlain by sandstones present severe limitations for use as landfills.

Unit 8: Interbedded Limestones and Shales

🟦 Areas of interbedded limestones and shales present severe, moderate, or slight limitations for use as landfills, depending on the relative amounts of limestone compared to shale. Areas that contain limestone layers 6 inches or more thick, which are horizontally continuous for 36 or more inches and contain less than 35 percent shale, are generally severely limited for landfills. Conversely, areas that have limestone layers that are 2 inches or less in thickness and are horizontally discontinuous (less than 6 inches long) present slight limitations for use as landfills. Areas with conditions between these two categories present moderate limitations.

Unit 9: Interbedded Limestones, Sandstones, and Shales

🟧 This unit consists of a vertical sequence of alternating limestones, sandstones, and shales. Areas underlain by limestones and sandstones present severe limitations, and areas underlain by shales that are 30 feet or more thick present slight limitations for use as landfills.

Unit 10: Coals, Sandstones, and Shales

🟩 This unit consists of a vertical sequence of coals, sandstones, and shales that is generally horizontally discontinuous. Areas underlain by coals and sandstones present severe limitations for use as landfills. Areas underlain by shales that are 30 feet or more thick present slight limitations.

Faults

⫽ Faults are fractures in the earth's crust along which displacement has occurred. In Kentucky, fault displacement is generally vertical. Faults can serve as avenues for the movement of fluids; therefore, faulted areas should be avoided for landfill use.

Definitions

Limestone: Layered rock composed of grains of calcite cemented together; may contain fossils.

Sandstone: Layered rock composed of grains of sand cemented together.

Shale: Thin-layered rock composed mostly of clay minerals.

Soil: Loose materials occurring between the ground surface and underlying bedrock.

Bedrock: Solid rock underlying soils and unconsolidated materials.

Joints: Widely spaced vertical cracks in the bedrock.

Faults: Fractures in the earth's crust along which displacement has occurred.

Leachate: Solution formed by water passing through a landfill.

Geologic information used in the compilation of this map was obtained from 1:24,000-scale geologic quadrangle maps produced as a result of the cooperative geologic mapping program between the Kentucky Geological Survey and the U.S. Geological Survey.

IMPORTANT NOTE:

This map is not intended to be used for selecting individual landfill sites. Its purpose is to inform land-use planners, government officials, and the public in a general way about geologic bedrock conditions throughout the state that affect the selection of solid-waste disposal sites. More detailed information concerning geologic bedrock conditions is provided by 1:24,000-scale geologic quadrangle maps. These maps should be consulted when considering the suitability of individual landfill sites. They are available for the entire state and may be obtained from the Kentucky Geological Survey. An *Index to Geologic Maps for Kentucky* is available free upon request from the Kentucky Geological Survey.

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scale approximately 1:560,000